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<110> Fuchs, Renate
     Wilske, Bettina
     Motz, Manfred
     Soutscheck, Erwin
     Preeac-Mursic, Vera

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  burgdorferi

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<150> US 09/196,293
<151> 1998-11-19

<150> US 08/209,603
<151> 1994-03-10

<150> US 07/862,535
<151> 1992-06-19

<150> WO PCT/EP90/02282
<151> 1990-12-21

<150> DE P40 18 988.0
<151> 1990-06-13

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Phe Val Asn Thr
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gttaattaca agggtcctta tgattctaca aatacatatg aacaaatagt aggtattggg       180
gagtttttag caaggccgtt gatcaattcc aatagtaagt caagttatta tggtaaatat       240
tttgttaata gatttattga cgatcaagat aaaaaagcaa gtgttgatat tttttctatt       300
ggtagtaagt cagagcttga tagtatatta aatctaagaa gaattc                      346

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<400> 5
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1               5                   10                  15
Gly Phe Pro Leu Asn Ala Arg Glu Val Asp Lys Glu Lys Leu Lys Asp
            20                  25                  30
Phe Val Asn Met Asp Leu Glu Phe Val Asn Tyr Lys Gly Pro Tyr Asp
        35                  40                  45
Ser Thr Asn Thr Tyr Glu Gln Ile Val Gly Ile Gly Glu Phe Leu Ala
    50                  55                  60
Arg Pro Leu Ile Asn Ser Asn Ser Asn Ser Ser Tyr Tyr Gly Lys Tyr
65                  70                  75                  80
Phe Val Asn Arg Phe Ile Asp Asp Gln Asp Lys Lys Ala Ser Val Asp
            85                  90                  95
Ile Phe Ser Ile Gly Ser Lys Ser Glu Leu Asp Ser Ile Leu Asn Leu
            100                 105                 110
Arg Arg Ile Leu Thr Gly Tyr Leu Ile Lys Ser Phe Asp Tyr Glu Arg
        115                 120                 125
Ser Ser Ala Glu Leu Ile Ala Lys Ala Ile Thr Ile Tyr Asn Ala Val
    130                 135                 140
Tyr Arg Gly Asp Leu Asp Tyr Tyr Lys Glu Phe Tyr Ile Glu Ala Ser
145                 150                 155                 160
Leu Lys Ser Leu Thr Lys Glu Asn Ala Gly Leu Ser Arg Val Tyr Ser
            165                 170                 175
Gln Trp Ala Gly Lys Thr Gln Ile Phe Ile Pro Leu Lys Lys Asn Ile
            180                 185                 190
Leu Ser Gly Asn Val Glu Ser Asp Ile Asp Ile Asp Ser Leu Val Thr
        195                 200                 205
Asp Lys Val Val Ala Ala Leu Leu Ser Glu Asn Glu Ser Gly Val Asn
    210                 215                 220
Phe Ala Arg Asp Ile Thr Asp Ile Gln Gly Glu Thr His Lys Ala Asp
225                 230                 235                 240
Gln Asp Lys Ile Asp Ile Glu Leu Asp Asn Phe His Glu Ser Asp Ser
            245                 250                 255
Asn Ile Thr Glu Thr Ile Glu Asn Leu Arg Asp Gln Leu Glu Lys Ala
            260                 265                 270
Thr Asp Glu Glu His Lys Lys Glu Ile Glu Ser Gln Val Asp Ala Lys
        275                 280                 285
Lys Lys Gln Lys Glu Glu Leu Asp Lys Lys Ala Ile Asp Leu Asp Lys
    290                 295                 300
Ala Gln Gln Lys Leu Asp Phe Ala Glu Asp Asn Leu Asp Ile Gln Arg
305                 310                 315                 320
Asp Thr Val Arg Glu Lys Leu Gln Glu Asn Ile Asn Glu Thr Asn Lys
            325                 330                 335
Glu Lys Asn Leu Pro Lys Pro Gly Asp Val Ser Ser Pro Lys Val Asp
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2

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                340                      345                      350
    Lys Gln Leu Gln Ile Lys Glu Ser Leu Glu Asp Leu Gln Glu Gln Leu
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    Glu Ile Lys Lys Asn Asp Glu Glu Leu Phe Lys Asn Lys Asp His Lys
    385                      390                      395                      400
    Ala Leu Asp Leu Lys Gln Glu Leu Asn Ser Lys Ala Ser Ser Lys Glu
                405                      410                      415
    Lys Ile Glu Gly Glu Glu Glu Asp Lys Glu Leu Asp Ser Lys Lys Asn
                420                      425                      430
    Leu Glu Pro Val Ser Glu Ala Asp Lys Val Asp Lys Ile Ser Lys Ser
            435                      440                      445
    Asn Asn Asn Glu Val Ser Lys Leu Ser Pro Leu Asp Glu Pro Ser Tyr
        450                      455                      460
    Ser Asp Ile Asp Ser Lys Glu Gly Val Asp Asn Lys Asp Val Asp Leu
    465                      470                      475                      480
    Gln Lys Thr Lys Pro Gln Val Glu Ser Gln Pro Thr Ser Leu Asn Glu
                485                      490                      495
    Asp Leu Ile Asp Val Ser Ile Asp Ser Ser Asn Pro Val Phe Leu Glu
                500                      505                      510
    Val Ile Asp Pro Ile Thr Asn Leu Gly Thr Leu Gln Leu Ile Asp Leu
            515                      520                      525
    Asn Thr Gly Val Arg Leu Lys Glu Ser Ala Gln Gln Gly Ile Gln Arg
        530                      535                      540
    Tyr Gly Ile Tyr Glu Arg Glu Lys Asp Leu Val Val Ile Lys Ile Asp
    545                      550                      555                      560
    Ser Gly Lys Ala Lys Leu Gln Ile Leu Asp Lys Leu Glu Asn Leu Lys
                565                      570                      575
    Val Ile Ser Glu Ser Asn Phe Glu Ile Asn Lys Asn Ser Ser Leu Tyr
                580                      585                      590
    Val Asp Ser Arg Met Ile Leu Val Val Val Lys Asp Asp Ser Asn Ala
                595                      600                      605
    Trp Arg Leu Ala Lys Phe Ser Pro Lys Asn Leu Asp Glu Phe Ile Leu
        610                      615                      620
    Ser Glu Asn Lys Ile Leu Pro Phe Thr Ser Phe Ala Val Arg Lys Asn
    625                      630                      635                      640
    Phe Ile Tyr Leu Gln Asp Glu Leu Lys Ser Leu Val Thr Leu Asp Val
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<213> Borrelia burgdorferi

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<212> PRT
<213> Borrelia burgdorferi

<400> 7
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 1               5                   10
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<212> DNA
<213> Borrelia burgdorferi

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<210> 9
<211> 34
<212> DNA
<213> Borrelia burgdorferi

<400> 9
gayytdttyg arwcwgtwga rgghytdytd aara   34

<210> 10
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<212> DNA
<213> Borrelia burgdorferi

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aattcaggga aggtggggat tctgcatcta ctaatcctgc tgacgagtct tgcgaaaggg   120
cctaatctta cagaaataag caaaaaaatt acagattcta atgcatttgt acttgctgtt   180
aaagaagttg agactttggt tttatctata gatgaacttg ctaagaaagc tattggtcaa   240
aaaatagaca ataataatgg tttagctgct ttaaataatc agaatggatc gttgttagca   300
ggagcctatg caatatcaac cctaataaca gaaaaattga gtaaattgaa aaatttagaa   360
gaattaaaga cagaaattgc aaaggctaag aaatgttccg aagaatttac taataaacta   420
aaaagtggtc atgcagatct tggcaaacag gatgctaccg atgatcatgc aaaagcagct   480
attttaaaaa cacatgcaac taccgataaa ggtgctaaag aatttaaaga tttatttgaa   540
tcagtagaag gtttgttaaa agcagctcaa gtagcactaa ctaattcagt taaagaactt   600
acaagtcctg ttgtagcaga aagtccaaaa aaaccttaa   639

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<212> PRT
<213> Borrelia burgdorferi

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            20   25   30
Pro Ala Asp Glu Ser Ala Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys
        35   40   45
Lys Ile Thr Asp Ser Asn Ala Phe Val Leu Ala Val Lys Glu Val Glu
    50   55   60
Thr Leu Val Leu Ser Ile Asp Glu Leu Ala Lys Lys Ala Ile Gly Gln
65   70   75   80
Lys Ile Asp Asn Asn Asn Gly Leu Ala Ala Leu Asn Asn Gln Asn Gly
                85   90   95
Ser Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Thr Glu Lys
            100   105   110
Leu Ser Lys Leu Lys Asn Leu Glu Glu Leu Lys Thr Glu Ile Ala Lys
            115   120   125
Ala Lys Lys Cys Ser Glu Glu Phe Thr Asn Lys Leu Lys Ser Gly His
        130   135   140
Ala Asp Leu Gly Lys Gln Asp Ala Thr Asp Asp His Ala Lys Ala Ala
145   150   155   160
Ile Leu Lys Thr His Ala Thr Thr Asp Lys Gly Ala Lys Glu Phe Lys
                165   170   175
Asp Leu Phe Glu Ser Val Glu Gly Leu Leu Lys Ala Ala Gln Val Ala
            180   185   190

4

Leu Thr Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser
        195   200   205
Pro Lys Lys Pro
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<210> 12
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<213> Borrelia burgdorferi

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cttgtaagta aagaaaaaga caaagacggt aagtacagtc taaaggcaac agtagacaag   180
attgagctaa aaggaacttc tgataaagac aatggttctg gggtgcttga aggtacaaaa   240
gatgacaaaa gtaaagcaaa attaacaatt gctgacgatc taagtaaaac cacattcgaa   300
cttttcaaag aagatggcaa aacattagtg tcaagaaaag taagttctaa agacaaaaca   360
tcaacagatg aaatgttcaa tgaaaaaggt gaattgtctg caaaaaccat gacaagagaa   420
aatggaacca aacttgaata tacagaaatg aaaagcgatg gaaccggaaa agctaaagaa   480
gttttaaaaa actttactct tgaaggaaaa gtagctaatg ataaagtaac attggaagta   540
aaagaaggaa ccgttacttt aagtaaggaa attgcaaaat ctggagaagt aacagttgct   600
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<213> Borrelia burgdorferi

<400> 13
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Cys Lys Gln Asn Val Ser Ser Leu Asp Glu Lys Asn Ser Ala Ser Val
            20   25   30
Asp Leu Pro Gly Glu Met Lys Val Leu Val Ser Lys Glu Lys Asp Lys
            35   40   45
Asp Gly Lys Tyr Ser Leu Lys Ala Thr Val Asp Lys Ile Glu Leu Lys
        50   55   60
Gly Thr Ser Asp Lys Asp Asn Gly Ser Gly Val Leu Glu Gly Thr Lys
65   70   75   80
Asp Asp Lys Ser Lys Ala Lys Leu Thr Ile Ala Asp Asp Leu Ser Lys
                85   90   95
Thr Thr Phe Glu Leu Phe Lys Glu Asp Gly Lys Thr Leu Val Ser Arg
            100   105   110
Lys Val Ser Ser Lys Asp Lys Thr Ser Thr Asp Glu Met Phe Asn Glu
            115   120   125
Lys Gly Glu Leu Ser Ala Lys Thr Met Thr Arg Glu Asn Gly Thr Lys
    130   135   140
Leu Glu Tyr Thr Glu Met Lys Ser Asp Gly Thr Gly Lys Ala Lys Glu
145   150   155   160
Val Leu Lys Asn Phe Thr Leu Glu Gly Lys Val Ala Asn Asp Lys Val
                165   170   175
Thr Leu Glu Val Lys Glu Gly Thr Val Thr Leu Ser Lys Glu Ile Ala
            180   185   190
Lys Ser Gly Glu Val Thr Val Ala Leu Asn Asp Thr Asn Thr Thr Gln
        195   200   205
Ala Thr Lys Lys Thr Gly Ala Trp Asp Ser Lys Thr Ser Thr Leu Thr
    210   215   220
Ile Ser Val Asn Ser Lys Lys Thr Thr Gln Leu Val Phe Thr Lys Gln
225   230   235   240
Asp Thr Ile Thr Val Gln Lys Tyr Asp Ser Ala Gly Thr Asn Leu Glu
            245   250   255

5

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Gly Thr Ala Val Glu Ile Lys Thr Leu Asp Glu Leu Lys Asn Ala Leu
            260                 265                 270
Lys


<210> 14
<211> 341
<212> PRT
<213> Borrelia burgdorferi

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            20                  25                  30
Glu Lys Leu Ser Ser Asn Tyr Arg Ile Asn Arg Ala Ser Asp Asp Ala
          35                  40                  45
Ala Gly Met Gly Val Ser Gly Lys Ile Asn Ala Gln Ile Arg Gly Leu
        50                  55                  60
Ser Gln Ala Ser Arg Asn Thr Ser Lys Ala Ile Asn Phe Ile Gln Thr
65                  70                  75                  80
Thr Glu Gly Asn Leu Asn Glu Val Glu Lys Val Leu Val Arg Met Lys
              85                  90                  95
Glu Leu Ala Val Gln Ser Gly Asn Gly Thr Tyr Ser Asp Ser Asp Arg
            100                 105                 110
Gly Ser Ile Gln Ile Glu Ile Glu Gln Leu Thr Asp Glu Ile Asn Arg
          115                 120                 125
Ile Ala Asp Gln Ala Gln Tyr Asn Gln Met His Met Leu Ser Asn Lys
        130                 135                 140
Ser Ala Ser Gln Asn Val Lys Thr Ala Glu Glu Leu Gly Met Gln Pro
145                 150                 155                 160
Ala Lys Ile Asn Thr Pro Ala Ser Leu Ser Gly Ser Gln Ala Ser Trp
              165                 170                 175
Thr Leu Arg Val His Val Gly Ala Asn Gln Asp Glu Ala Ile Ala Val
            180                 185                 190
Asn Ile Tyr Ser Ala Asn Val Ala Asn Leu Phe Ala Gly Glu Gly Ala
          195                 200                 205
Gln Ala Ala Gln Ala Ala Pro Val Gln Glu Gly Ala Gln Glu Glu Gly
        210                 215                 220
Ala Gln Gln Pro Thr Pro Ala Thr Ala Pro Thr Gln Gly Gly Val Asn
225                 230                 235                 240
Ser Pro Val Asn Val Thr Thr Thr Val Asp Ala Asn Thr Ser Leu Ala
              245                 250                 255
Lys Ile Glu Asn Ala Ile Arg Met Ile Ser Asp Gln Arg Ala Asn Leu
            260                 265                 270
Gly Ala Phe Gln Asn Arg Leu Glu Ser Ile Lys Asn Ser Thr Glu Tyr
          275                 280                 285
Ala Ile Glu Asn Leu Lys Ala Ser Tyr Ala Gln Ile Lys Asp Ala Thr
        290                 295                 300
Met Thr Asp Glu Val Val Ala Ala Thr Thr Asn Ser Ile Leu Thr Gln
305                 310                 315                 320
Ser Ala Met Ala Met Ile Ala Gln Ala Asn Gln Val Pro Gln Tyr Val
              325                 330                 335
Leu Ser Leu Leu Arg
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<210> 15
<211> 209
<212> PRT
<213> Borrelia burgdorferi

<400> 15
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            20   25   30
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
        35   40   45
Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala
        50   55   60
Leu Leu Ser Ser Ile Asp Glu Ile Ala Ala Lys Ala Ile Gly Lys Lys
65   70   75   80
Ile His Gln Asn Asn Gly Leu Asp Thr Glu Asn Asn His Asn Gly Ser
                85   90   95
Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Lys Gln Lys Leu
            100   105   110
Asp Gly Leu Lys Asn Glu Gly Leu Lys Glu Lys Ile Asp Ala Ala Lys
            115   120   125
Lys Cys Ser Glu Thr Phe Thr Asn Lys Leu Lys Glu Lys His Thr Asp
        130   135   140
Leu Gly Lys Glu Gly Val Thr Asp Ala Asp Ala Lys Glu Ala Ile Leu
145   150   155   160
Lys Thr Asn Gly Thr Lys Thr Lys Gly Ala Glu Glu Leu Gly Lys Leu
                165   170   175
Phe Glu Ser Val Glu Val Leu Ser Lys Ala Ala Lys Glu Met Leu Ala
            180   185   190
Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro Lys
            195   200   205
Pro

<210> 16
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<212> PRT
<213> Borrelia burgdorferi

<400> 16
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1   5   10

7